Cook Inlet
Workshop Report

Introduction

A Port Risk Assessment Workshop was conducted for Cook Inlet, Alaska on October 10 and 11, 2000. This workshop report provides the following information:

- Brief description of the process used for the assessment;
- List of participants;
- Numerical results from the Analytic Hierarchy Process (AHP) [1];
- Summary of risks and mitigations discussion; and
- Cook Inlet Attributes Summaries.

Strategies for reducing unmitigated risks will be the subject of a separate report.

Assessment Process

The risk assessment process is a structured approach to obtaining expert judgments on the level of waterway risk. The process also addresses the relative merits of specific types of Vessel Traffic Management (VTM) improvements for reducing risk in the port. Based on the Analytic Hierarchy Process (AHP), the port risk assessment process uses a select group of experts/stakeholders in each port to evaluate waterway risk factors and the effectiveness of various VTM improvements. The process requires the participation of local Coast Guard officials before and throughout the workshops. Thus the process is a joint effort involving waterway user experts, stakeholders, and the agencies/entities responsible for implementing selected risk mitigation measures.

This methodology employs a generic model of port risk that was conceptually developed by a National Dialog Group on Port Risk and then translated into computer algorithms by the Volpe National Transportation Systems Center. In that model, risk is defined as the sum of the probability of a casualty and its consequences. Consequently, the model includes variables associated with both the causes and the effects of vessel casualties. Because the risk factors in the model do NOT contribute equally to overall port risk, the first session of each workshop is devoted to obtaining expert opinion about how to weight the relative contribution of each variable to overall port risk. The experts then are asked to establish scales to measure each variable. Once the parameters have been established for each risk-inducing factor, port specific risk is estimated by putting into the computer risk model specific values for that port for each variable. The computer model allows comparison of relative risk and the potential efficacy of various VTM improvements between different ports.

- [1] Developed by Dr. Thomas L. Saaty, et al, to structure complex decision making, to provide scaled measurements, and to synthesize many factors having different dimensions.

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Numerical Results

Book 1 – Risk Categories *(Generic Weights Sum to 100)*

Fleet Composition	Traffic Conditions	Navigational Conditions	Waterway Configuration	Immediate Consequences	Subsequent Consequences
26.1	11.6	17.6	6.3	17.9	20.5

Analysis:

Book 1 begins the process of weighting the national port risk model. The participant teams use their knowledge and the AHP process to provide weights for the six major risk categories. The contribution to the national model by the Cook Inlet participants is as listed above. These participants felt that fleet composition was the largest driver of risk. Waterway configuration was a significantly lower influence.

Book 2 - Risk Factors *(Generic Weights)*

Fleet Composition	Traffic Conditions	Navigational Conditions	Waterway Configuration	Immediate Consequences	Subsequent Consequences
26.1	11.6	17.6	6.3	17.9	20.5

% High Risk Deep Draft	Volume Deep Draft	Wind Conditions	Visibility Obstructions	Number People on Waterway	Economic Impacts
18.5	2.7	3.5	2.0	6.6	3.6
% High Risk Shallow Draft	Volume Shallow Draft	Visibility Conditions	Channel Width	Volume of Petroleum	Environmental Impacts
7.6	2.1	8.2	2.0	7.0	5.5
	Vol. Fishing & Pleasure Craft	Tide & River Currents	Bottom Type	Volume of Chemicals	Health & Safety Impacts
	1.8	2.9	0.9	4.3	11.4
	Traffic Density	Ice Conditions	Waterway Complexity		
	5.0	3.0	1.4		

Analysis:

Book 2 further refines the weighting for the national port risk model. The participants examined the importance of the 20 risk factors to port safety and provided the above results to the national model. They determined that the following factors contribute the most to overall risk under each of the six major categories:

- Fleet Composition: High-Risk Deep Draft Vessels contribute the highest amount of risk and High Risk Shallow Draft Vessels contribute the fourth highest amount of risk.
- Traffic Conditions: Traffic Density contributes the eighth highest amount of risk.
- Navigational Conditions: Visibility Conditions contribute the third highest amount of risk.
- Waterway Configuration: Channel Width and Visibility Obstructions contribute only a minor amount of risk.
- Immediate Consequences: The Volume of Petroleum contributes the fifth highest amount of risk and the Number of People on Waterway the sixth highest amount of risk.
- Subsequent Consequences: Health and Safety Impacts contributes the second highest amount of risk.

Book 3 Factor Scales - Condition List *(Generic)*

	Scale Value
Wind Conditions	
a. Severe winds < 2 days / month	1.0
b. Severe winds occur in brief periods	2.1
c. Severe winds are frequent & anticipated	4.5
d. Severe winds occur without warning	9.0
Visibility Conditions	
a. Poor visibility < 2 days/month	1.0
b. Poor visibility occurs in brief periods	2.3
c. Poor visibility is frequent & anticipated	4.7
d. Poor visibility occurs without warning	9.0
Tide and River Currents	
a. Tides & currents are negligible	1.0
b. Currents run parallel to the channel	2.3
c. Transits are timed closely with tide	4.6
d. Currents cross channel/turns difficult	9.0
Ice Conditions	
a. Ice never forms	1.0
b. Some ice forms-icebreaking is rare	2.0
c. Icebreakers keep channel open	5.5
d. Vessels need icebreaker escorts	9.0
Visibility Obstructions	
a. No blind turns or intersections	1.0
b. Good geographic visibility-intersections	1.9
c. Visibility obscured, good communications	4.5
d. Distances & communications limited	9.0

Channel Width

a. Meetings & overtakings are easy	1.0
b. Passing arrangements needed-ample room	2.4
c. Meetings & overtakings in specific areas	6.2
d. Movements restricted to one-way traffic	9.0

Bottom Type

a. Deep water or no channel necessary	1.0
b. Soft bottom, no obstructions	1.8
c. Mud, sand and rock outside channel	4.6
d. Hard or rocky bottom at channel edges	9.0

Waterway Complexity

a. Straight run with NO crossing traffic	1.0
b. Multiple turns > 15 degrees-NO crossing	2.7
c. Converging - NO crossing traffic	4.6
d. Converging WITH crossing traffic	9.0

Number of People on Waterway

a. Industrial, little recreational boating	1.0
b. Recreational boating and fishing	3.9
c. Cruise & excursion vessels-ferries	6.4
d. Extensive network of ferries, excursions	9.0

Petroleum Volume

a. Little or no petroleum cargoes	1.0
b. Petroleum for local heating & use	2.9
c. Petroleum for transshipment inland	5.5
d. High volume petroleum & LNG/LPG	9.0

Chemical Volume

a. Little or no hazardous chemicals	1.0
b. Some hazardous chemical cargo	2.5
c. Hazardous chemicals arrive daily	5.2
d. High volume of hazardous chemicals	9.0

Economic Impacts

a. Vulnerable population is small	1.0
b. Vulnerable population is large	3.0
c. Vulnerable, dependent & small	5.6
d. Vulnerable, dependent & large	9.0

Environmental Impacts

a. Minimal environmental sensitivity	1.0
b. Sensitive, wetlands, VULNERABLE	2.8
c. Sensitive, wetlands, ENDANGERED	6.0
d. ENDANGERED species, fisheries	9.0

Health and Safety Impacts

a. Small population around port	1.0
b. Medium - large population around port	2.4
c. Large population, bridges	5.3
d. Large DEPENDENT population	9.0

Analysis:

The purpose of Book 3 is for the participants to calibrate a risk assessment scale for each risk factor. For each risk factor there is a low (Port Heaven) and a high (Port Hell) severity limit, which are assigned values of 1.0 and 9.0 respectively. The participants determined numerical values for two intermediate qualitative descriptions between those two extreme limits. On average, participants from this port evaluated the difference in risk between the lower limit (Port Heaven) and the first intermediate scale point as being equal to 1.5; the difference in risk between the first and second intermediate scale points was equal to 2.7; and the difference in risk between the second intermediate scale point and the upper risk limit (Port Hell) was 3.8.

Book 4 - Risk Factor Ratings *(Cook Inlet)*

Fleet Composition	**Traffic Conditions**	**Navigational Conditions**	**Waterway Configuration**	**Immediate Consequences**	**Subsequent Consequences**
7.2	**13.5**	**15.8**	**12.5**	**14.5**	**13.7**

% High Risk Deep Draft	**Volume Deep Draft**	**Wind Conditions**	**Visibility Obstructions**	**Number People on Waterway**	**Economic Impacts**
3.0	**2.3**	**4.2**	**1.6**	**4.6**	**4.4**
% High Risk Shallow Draft	**Volume Shallow Draft**	**Visibility Conditions**	**Channel Width**	**Volume of Petroleum**	**Environmental Impacts**
4.2	**3.4**	**2.9**	**3.0**	**7.3**	**6.8**
	Vol. Fishing & Pleasure Craft	**Tide & River Currents**	**Bottom Type**	**Volume of Chemicals**	**Health & Safety Impacts**
	4.5	**3.8**	**4.6**	**2.6**	**2.5**
	Traffic Density	**Ice Conditions**	**Waterway Complexity**		
	3.3	**4.9**	**3.3**		

Analysis:

This is the point in the workshop when the process begins to address local port risks. The participants use the scales developed in Book 3 to assess the absolute level of risk in their port for each of the 20 risk factors. The values shown in the preceding table do NOT add up to 100. Based on the input from the participants, the following are the top risks to port safety in Cook Inlet (in declining order of importance):

1. Volume of Petroleum (7.3)
2. Environmental Impacts (6.8)
3. Ice Conditions (4.9)
4. Bottom Type (4.6) (tie)
4. Number of People on Waterway (4.6) (tie)
5. Volume of Fishing & Pleasure Craft (4.5)
6. Economic Impacts (4.4)
7. % High Risk Shallow Draft (4.2) (tie)
7. Wind Conditions (4.2) (tie)

Book 5 - VTM Tools (*Cook Inlet*)

Fleet Composition	**Traffic Conditions**	**Navigation Conditions**	**Waterway Configuration**	**Immediate Consequences**	**Subsequent Consequences**

% High Risk Deep Draft		**Volume Deep Draft**		**Wind Conditions**		**Visibility Obstructions**		**Number of People on Waterway**		**Economic Impacts**	
7	0.4	**20**	-0.8	**6**	0.5	**13**	-0.3	**5**	0.6	**16**	-0.4
RA		RA		RA		RA		RA		RA	
% High Risk Shallow Draft		**Volume Shallow Draft**		**Visibility Conditions**		**Channel Width**		**Volume of Petroleum**		**Environmental Impacts**	
7	0.4	**17**	-0.4	**9**	0.0	**13**	-0.3	**3**	0.8	**1**	1.3
RA		RA		RA		RA		RA		RA	
		Vol. Fishing & Pleasure Craft		**Tide & River Currents**		**Bottom Type**		**Volume of Chemicals**		**Health & Safety Impacts**	
		10	0.0	**12**	-0.1	**2**	0.8	**19**	-0.6	**15**	-0.3
		RA		RA		RA		RA		RA	
		Traffic Density		**Ice Conditions**		**Waterway Complexity**					
		18	-0.4	**4**	0.7	**11**	-0.1				
		RA		RA	ALERT	RA					

Legend:

See the **KEY** (below). Rank is the position of the Risk Gap for a particular factor relative to the Risk Gap for the other factors as determined by the participants. Risk Gap is the variance between the existing level of risk for each factor determined in Book 4 and the average acceptable risk level as determined by each participant team. Negative numbers imply that the risk level could INCREASE and still be acceptable. The teams were instructed as follows: *If the acceptable risk level is equal to or higher than to the existing risk level for a particular factor, circle RA (Risk Acceptable). If the mitigation needed does not fall under one of the VTM tools, circle OTH (Other) at the end of the line. Otherwise, circle the VTM tool that you feel would MOST APPROPRIATELY reduce the unmitigated risk to an acceptable level.*

The tool listed is the one determined by the majority of participant teams as the best to narrow the Risk Gap. An ALERT is given if no mathematical consensus is reached for the tool suggested. Below are the tool acronyms and tool definitions.

KEY	
Risk Factor	
Rank	Risk Gap
Tool	ALERT

RA	Risk Acceptable	DI	Improve Dynamic Navigation Info
AN	Improve Aids to Navigation	VTIS	Vessel Traffic Information System
CM	Improve Communications	VTS	Vessel Traffic System
RR	Improve Rules & Regulations	OTH	Other – not a VTM solution
SI	Improve Static Navigation Info		

Analysis:

The results shown are consistent with the discussion that occurred about risks in Cook Inlet. For all 19 of the risk factors for which there was good consensus, the participants judged the risk to be at an acceptable level already due to existing mitigation strategies.

A no consensus alert occurred because votes were split between several VTM tools, as indicated:
- Ice Conditions – RA (5), RR (1), SI (1), DI (2), VTIS (1), VTS (1)

Summary of Risks

Scope of the port area under consideration: The participants defined the geographic bounds of the port area to be discussed.
- All of Cook Inlet from Kennedy Entrance (Barren Islands) northward to the Port of Anchorage.
- Includes ports at Kenai, Nikiski, Homer, Drift River, Seldovia.
- Excludes Turnagain Arm and Knik Arm north of Anderson Dock.

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Fleet Composition		
Percent High Risk Deep Draft Cargo & Passenger Vessels	**Today:** • Few ships of this category in the inlet • Well maintained, newer in age, and have improved over the last five years • LNG ships (2) are top notch hulls • Spot charter ships may not have high power. Most transit to Agrium dock at Nikiski, and cement ships to Anchorage. They are generally less prepared for cold weather, crew protection, anchoring, overall preparations • Log carriers into Homer where there is no ice… not a problem • Tankers in good condition • No significant discrepancies found during inspections of spot charters • Concern for mixed component crews, that languages are compatible for safe operation, haven't had the problem here…yet. A risk • No foreign vessels have been detained by COTP for PCS discrepancies in the last two years – Priority I vessels are rare – About 6 Priority II vessels per year • 20 annual casualties experienced in inlet: usually that ships are unsuitable for winter weather climate; HP / beam / hull reinforcing are factors **Trends:** • Increasing quality	**Existing Mitigations:** • Agents put cold weather gear aboard spot charters now • Companies are evaluating ships closely (vetting) for Cook Inlet service • Most ships are high powered • Bridge resource management training • COTP inspects vessels for winter operating ability • Active Port State Control program **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Fleet Composition (continued)		
Percent High Risk Shallow Draft Cargo & Passenger Vessels	**Today:** • OSVs operating from Nikiski to oil platforms are US flag inspected; have occasional, minor accidents – 28 inspected f/v – ~100 6- passenger vessels chartered with varied quality • Concern for quality of vessels below OSV category…fish tenders, barges, are an increased risk (Homer, Seward), and are operating under old rules' exemptions • Unlicensed operators do not understand the need to communicate with other vessels • Fuel barges are often old, and the crews the tugs not well trained. Operating from Nikiski to Anchorage. • F/V industry has worst casualty record (Operating out of Seldovia and Port Graham, Kenai and Homer) • F/V exemption for fishing related cargoes has been stretched: resulting in unlicensed captains & vessels carrying all manner of commodities. Vessels are from both in and outside Cook Inlet • Casualty history high for tow boat industry… freight barge or tank barges, but depends on company's policies. Companies following the American Waterways Operators "Responsible Carriers Program" records are much better. 60% are of this category in CI • New ship to be used at Drift River will have 1000 less HP, reduced capability compared to previous ship • Vessels not necessarily using National Distress System, VHF-FM **Trends:** • Not discussed	**Existing Mitigations:** • Voluntary boating safety education, with active CG Auxiliary **New ideas:** • Pamphlet on proper anchoring techniques • Harbormasters with info sign/publications educating boaters bout NDS, safe boating practices

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Traffic Conditions		
Volume of Deep Draft Vessels	**Today:** • Totem boats: 140 moves yearly • CSX: 100 per year • Alaskan pilots: 1999 – 709 moves, 2000 year-to-date - 438 • Petroleum tankers: 40 annually • 33-35 LNG ships annually • Cruise ships: 2 to Anchorage yearly **Trends:** • Deep draft dredges perhaps 1 per year in future, one week duration. 1 in last 10 years • Tonnage trend is flat to slight increase, but bigger ships so fewer transits • All of CI lost business, chip and log ships are way down • Tanker traffic may be down due to Alaskan refining capability • Anchorage sees steady trend; creating intermodal facility, extending dock • Mat-Su Borough hopes to get wood ship operation on line in two years. • Cruise vessel traffic not likely to increase except from Asia. • LNG from North Slope may come into Cook Inlet, creating slight increase in traffic.	**Existing Mitigations:** • Capacity exists to handle any foreseeable increase in deep draft traffic **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Traffic Conditions (continued)		
Volume of Shallow Draft Vessels	**Today:** • Commercial F/V: about 300 • Dredges: 2-3 typically in summer at Anchorage • Seismic vessel activity 1997-98: about 100 days. Potential for future activity • Tug/tow: about 200 to Anchorage yearly • Kachemak Bay anchorage sufficient for that area. Critical habitat area could affect use in future • Ferry connecting Seward, Homer and Kodiak transits Kachemak Bay often • Small vessels from Homer, Anchor Point, Kenai, Deep River, Kachemak Bay cause entry problems for larger vessels • 450 fishing boats within Ninilchik to Drift River • OSVs: 5 with daily transits to platforms. • No dinner cruise boats **Trends:** • Less shallow tug/barge traffic. No new vessels entering fleet	**Existing Mitigations:** • None discussed **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Traffic Conditions (continued)		
Volume of Fishing & Pleasure Craft	**Today:** • Vicinity Ninilchik & Homer with usual problem as poor radar targets, not understanding restrictions of larger ships • Summer weekend 200-1000 fishing/pleasure craft in Cook Inlet • High recreational boat volume between Anchor Point and Deep Creek. May to September. Use tractors to launch over beach, often in surf. Some try to self-launch which leads to capsizings • Boater activity affects commercial fishing vessel activity • Highly seasonal Ninilchik – Anchor Pt **Trends:** • Not discussed	**Existing Mitigations:** • Commercial fishing season openings limited to non-weekend times, separates fleets by time **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Traffic Conditions (continued)		
Traffic Density	**Today:** • Memorial to Labor Day higher traffic volumes with pleasure boating, fishing • Commercial drift net F/V – recreational boater conflicts • Voluntary traffic system in Kachemak Bay, in and outbound, that fishing boats and pleasure craft don't seem to know about or disregard • Pilots try to give small boats more sea room than larger vessels because of their free board. Causes a lot of weaving • Areas of drift fishing south and east of Kalgin Is. Highest density in July • Kenai Flats to Anchor Pt, salmon fishing openers Nikiski to Ninilchik, boats all over channel, drift nets are 1000 feet long • Homer fishing derby in October. Homer winter king derby; 100 vessels close to shore • Deep draft / recreation boat mix problem at Homer approach at times. Marks Point at Homer for pilot ferry, charter fleet. Hope people are listening on radio • Navigation can be a problem at Flat Island as deep drafts don't have pilot yet, and encounter a large mix of boats • Kachemak Bay passing situations get close at 60 foot rock…at buoy off spit is where everything happens • Wintertime dockage at Nikiski can get crowded **Trends:** • None discussed	**Existing Mitigations:** • Communications are usually very good • Mandatory pilotage • Plenty of maneuvering room generally **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Navigation Conditions		
Wind Conditions	**Today:** • Generally northerly with topography influences • 15 year data shows southwest wind causes most trouble at Kenai/Nikiski • Summer winds South / SW; winter winds North / NE • Cross winds trouble at Nikiski, option to abort docking • Drift River terminal, northerly winter winds cause trouble, but pilots can abort docking • Wind is greatest factor during docking • Winter winds drive ice, making another type of problem • At Nikiski dock, 20 knots from SW a problem, 50 knots from NE okay • Winds at Barrens I. / Flat I cause charter fleet trouble returning to port • Swell more trouble than wind at the pilot station • North winter winds causes trouble docking at Anchorage • Williwaws in Kachemak Bay in winter cause trouble • Wind prediction is poor; local radio never mentions wind. Weather observation stations are on the east side, except for two new stations (Drift River and Augustine Island) **Trends:** • None discussed	**Existing Mitigations:** • NOAA reporting fleet observations • NOAA weather radio broadcast from Anchorage is rebroadcast from Kodiak • Weather information availability **New ideas:** • Need weather observations from other ships and sources, weather starts here

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Navigation Conditions (continued)		
Visibility Conditions	**Today:** • Anchorage has fog 1.5 days per year, snow 20% of time in winter • June/July 15% fog in Home. Can sit there, generally 24 hours, 48 max • Small boats that don't show up on radar or that don't have radar are the problem • Summer fogs happen, rolls in from Kennedy Entrance to Homer in three hours • Port Graham a daylight only port because of natural ranges being used **Trends:** • None discussed	**Existing Mitigations:** • Predictability. Expect and prepare for fog • Pilotws reduce speed in fog • Fog not a significant problem, just reduce speed to operate **New ideas:** • None discussed
Navigation Conditions (continued)		
Tide & River Currents	**Today:** • Variance between observed tides and predicted tides because of wind's effect • Biggest problem when combined with ice in winter • 8 knot current through N. Forelands parallel to beach, nobody goes there • Cross current a problem at Nikiski flats • Set out of Turnagain Arm not a problem • Cross current at Drift River makes docking difficult • Oil platforms create special local problems – Potential for disabled ships colliding with them – Ships dragging anchor catching pipelines – Vessels alongside being capsized by strong currents and turbulance **Trends:** • None discussed	**Existing Mitigations:** • Local knowledge dictates staying down-current when ice present • Expected condition, used to advantage when possible • Nikiski: pilots using currents to help bring ships alongside without tugs **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Navigation Conditions (continued)		
Ice Conditions	**Today:** • Upper Cook Inlet has ice six months of year, moving at current speed, beach gets fast, but channels are always moving • Homer brash ice piles up, causing trouble for some vessels • Some smaller vessels get caught in ice and cannot maneuver • Harriet Point (Drift River) choke point where there's ice not seen at dockside • More pan ice in lower inlet, larger floes there • Jams at Forelands often, other places too, mostly a problem with westerly winds • Docking at Nikiski is hazardous. Arrivals delayed to keep number of ships alongside controlled in case of emergency • CG practice of removing buoys in winter not significant detriment to commercial traffic **Trends:** • None discussed	**Existing Mitigations:** • Excellent communications between all parties on Cook Inlet in reporting observed conditions • Double hulls used in winter • Pilot's ice rules: If the ship loses ½ its speed inbound, pilots will not continue in • NOAA ice observers guide published for consistent ice condition reporting • Learning more about ice operations as time progressing • Inlet overflights by pilots, terminal operatiors; NWS ice forecaster targeting Cook Inlet • Traffic density lower in winter • Real-time ice info technologically possible now • Terminals set winter guidelines(# mooring lines, engines on-line, crews at stations) • Tension monitors (LNG terminal only) / quick release hooks at Nikiski docks • COTP Winter Operating Guidelines (coast pilot) COTP compliance boardings at Homer; sets crew protection and machinery requirements, draft-below-ice standards, mooring rules, and cargo operation standards **New ideas:** • Economics continue to push efficiency in port while maintaining the safety level • Considering quick release Mooring line hooks at Anchorage too

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Waterway Configuration		
Visibility Obstructions	**Today:** • Blind spots at Homer spit especially for small craft • Background lighting not a problem anywhere, not even at Anchorage • Commercial F/V with bright sodium lights can make navigating difficult **Trends:** • None discussed	**Existing Mitigations:** • None discussed **New ideas:** • None discussed
Waterway Configuration (continued)		
Channel Width	**Today:** • Cook Inlet is broad seaway • Deep Draft can't pass at Knik Arm Shoal • Mouth of Homer harbor is narrow • Seldovia narrow; shallow draft can't pass. Channel is 200 yds wide in short stretch. Accident once in 5 years **Trends:** • None discussed	**Existing Mitigations:** • None discussed **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Waterway Configuration (continued)		
Bottom Type	**Today:** • Both hard and soft bottoms with rolling boulders • Biggest fear is that vessel will roll over if aground when tide goes out • At Kenai and Kasilof is hard shoal, shallow draft vessels use this area • Deep draft vessels not usually in areas where bottom type is a problem. Can happen that they snag a boulder • Pipelines off Forelands and Moose Point • Cable fields by Knik Shoal/Pt Waranzof • Pipelines laid in areas not as authorized • Buoy at Moose Point Shoal too small to see well, larger buoy? **Trends:** • None discussed	**Existing Mitigations:** • Pilots slow down in shallow water to avoid squatting • ATON adequate • Accurate charting (pretty good quality) Surveyed entirely since 1974 • Under-keel clearance requirements • Good system for latest information to be distributed to mariners, shared knowledge • Web site for current navigation information for Knik Arm Shoal and Anchorage docks provided by Port of Anchorage. ftp:\\ftp.poa.usace.army.mil/ • Range going in at Nikiski Flats due next year **New ideas:** • Underwater pipeline feeder lines are not equipped with pressure gauges as are main lines. Additional consideration needed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Waterway Configuration (continued)		
Waterway Complexity	**Today:** • Straightness: Homer has two right angles • Merging traffic at Homer entrance • Ferry operates from Homer to Seldovia (reduced in winter), just joins the traffic flow; not crossing traffic flow • OSV traffic from Nikiski to platforms not a problem • Drift River to Nikiski tankers twice per month…go south if ice precludes direct route across • Homer harbor entrance has two right angle turns w/fuel dock both sides, lots of small traffic might conflict **Trends:** • None discussed	**Existing Mitigations:** • None discussed **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Immediate Consequences		
Number of People on Waterway	**Today:** • Homer-Seldovia ferry; winter 50-70 passengers,; summer, 220 passengers • Charter F/V-60 • One cruise ship this summer to Anchorage • Danny J. - 36 people on charter from Homer to Halibut cove • Visiting USCG ships to Homer (378's) • Holes in VHF-FM coverage, small and usually in shallower waters • Golden Bear (CA Maritime) occasionally **Trends:** • None discussed	**Existing Mitigations:** • Inspected charter boats have higher requirements (lift rafts) • Voluntary higher standards for uninspected vessels - in Alaska, uninspected passenger vessel voluntary safety program (AKA 5star) owner chooses level safety desired • Active commercial fishing vessel inspection program • State will have recreational boating safety program on line next year • USCG Kodiak helos (less than 2 hours) and private helicopters, state helos, ANG helo • Active waterway provides good Samaritan possibilities, self-help reliance • Local fire departments have small boats • EPIRBs and mandated radiotelephones **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Immediate Consequences (continued)		
Volume of Petroleum Cargoes	**Today:** • 40% of cargo into Anchorage is petroleum; in recent years has dropped of considerably • All Cook Inlet sees bulk two ships at anchorage per month • Two barges / week April-September • Nikiski tankers product outbound • Drift River tanker • Handful of barges per week • Tankers carrying less than 500,000 bbls; barges 150,000 bbls; LNG 550,000 bbls; Ammonia vessels average 400K bbls • Size restriction determined by oil spill response capability and draft limitations at dock Nikiski (-43) Anchorage (-35) • Question whether spot charters have tools and response capabilities to protect the environment. Non-tanker industry is not as well prepared to address this • Increased pressure to use dispersants has its own environmental consequences **Trends:** • Over last 5 years there has been significant drop off in oil spills…had been two per year. Improving trend	**Existing Mitigations:** • Nikinski COOP well stocked, Class A (highest level) Oil Spill Recovery Organization (OSRO). Cook Inlet Spill Prevention & Response, Inc.(CISPRI) also present. Some equipment at Homer • CHADUX, Anchorage (and some equipment at Nikiski) for refined petroleum product recovery • Hydrostatic loading procedures and double hull requirements • Area Contingency Plans, Vessel Response Plans, integrated management with all members of the regional community • Real-event experience plus active exercise programs • Self lightering and vessel of opportunity lightering possibilities • Extra oil storage at CISPRI • F/V program in each community that responds to oil spills also • 400 gross ton and higher ship have financial responsibility certificates requirement **New ideas:** • Incorporate ship bunkers into the spill management / prevention planning & requirements similar to tank ships • New techniques to handle current driven spills effectively • More training for crewmen also • Require tug escorts

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Immediate Consequences (continued)		
Volume of Hazardous Chemical Cargoes	**Today:** • 20-25 anhydrous ammonia ships / year out of Nikiski • 3 LNG ships per month to Nikiski; cargo of particular hazard; 550K bbls in bulk • RORO / CSX container trailers at Anchorage carry hazardous materials; 100+ ships annually for each company **Trends:** • None discussed	**Existing Mitigations:** • None discussed **New ideas:** • None discussed
Subsequent Consequences		
Economic Impacts	**Today:** • Closure by ice more likely than pollution, but ships can still pass at higher stage of tide • Limited oil storage capacity at docks requires product to be shipped regularly or shut down machinery, which can cause damage • Totem / CSX have no warehousing on shore for general cargo, three days supply at port – Happens less than once a year; 1986 or ‘87 was last time missed sailings • More critical to get fuel to outlying communities (Nikiski pipeline for jet fuel, 3-4 weeks supply) • Drift River terminal w/o ships to transport product has to shut down oil field, may not be able to get it back, one tank storage. Significant impact • Osprey platform will come on line October 2000, will double Cook Inlet output to 18,000 bbls daily **Trends:** • None discussed	**Existing Mitigations:** • Oil fields try to empty storage tanks by December to absorb product in case of shipping interruption **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Subsequent Consequences (continued)		
Environmental Impacts	**Today:** • Kachemak Bay critical habitat for shellfish. Environmentally conscious population there • River mouths of Kenai, Kasilof and Susitna: salmon transits. Major clam bed at Ninilchik, Holly Creek, Clam Gulch • Other sensitive areas: – Neal River behind Augustine Island – Port Graham and English Bay because of subsistence – E. side of Kalgin I – Beluga whale concern in all of Inlet – Ship Creek at the Port of anchorage • Hundreds of salmon streams across area **Trends:** • None discussed	**Existing Mitigations:** • NOAA is trying to better understand and model currents, more support for modeling and measurement. 3D dispersed plume model • Efforts to track ice and currents, effect of wind and various tide ranges • North Slope crude is more tenacious, and is no longer frequently brought into CI • Some shore ice will protect shoreline • Some species not present in winter, and not acutely affected • Geographic Response Strategies for central Cook Inlet in place, working on plan for mud flat at upper Cook Inlet, kick off meeting soon for southern Cook Inlet w/focus on Kachemak Bay **New ideas:** • Establish marine sanctuaries that restrict entry • Studying effectiveness of burning oil in ice • Better info on what shorelines are like now in case there is a spill. Baseline of data needed • Kachemak Bay is port of refuge that introduces tenuous vessels into critical wildlife habitat area. May need to find aternative • Effects of pollution on wildlife needs to be better understood in order to adequately plan

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Subsequent Consequences (continued)		
Health & Safety Impacts	**Today:** • 2/5 of Alaska's population is in Anchorage, 250,000 people • Kenai 7,000 people • Nikiski LNG danger (1,000 population) • Kenai 12 miles down shore from LNG facility • Homer: ammonia venting danger, 4,000 people in city, 10,000 in area; ships at anchor awaiting entry to other ports • Water supply not affected • No cooling water for industry **Trends:** • None discussed	**Existing Mitigations:** • None discussed **New ideas:** • None discussed